

Application No. 10/792,342

Reply to Office Action

*REMARKS/ARGUMENTS**The Pending Claims*

Claims 1-13 and 15 are pending. Claims 1-13 and 15 are directed toward a polyurethane polishing pad for chemical-mechanical polishing.

Summary of the Office Action

The Office Action rejects claims 1-9 and 13 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent 4,239,567 (hereinafter "Winings") in view of U.S. Patent 5,670,102 (hereinafter "Perman"). Claims 11 and 12 stand rejected under 35 U.S.C. § 103(b) as allegedly obvious in view of Winings in combination with U.S. Patent 6,790,883 (hereinafter "Ogawa") and Perman. Claim 15 stands rejected as allegedly obvious in view of Winings in combination with U.S. Patent 6,239,188 (hereinafter "Kihara") and Perman.

Furthermore, the Office Action rejects claims 1-10, 13, and 14 under 35 U.S.C. § 103(a) as being allegedly unpatentable over U.S. Patent 6,406,363 (hereinafter "Xu") in view of Perman. Claims 11 and 12 stand rejected as allegedly obvious in view of Xu in combination with Ogawa and Perman. Claim 15 stands rejected as allegedly obvious in view of Xu in combination with Kihara and Perman.

Discussion of the Obviousness Rejections

The Office Action asserts that it would have been obvious to one having ordinary skill in the art to employ the microcellular foam of Perman to make a polishing pad because the features of the Perman microcellular foam are well known in the art and Perman provides necessary details to practice the invention of Winings or Xu.

As is well-settled, in order to establish a *prima facie* case of obviousness, three basic criteria must be met: (a) the prior art references must teach or suggest all the claim limitations, (b) there must be some suggestion or motivation to modify the reference or to combine reference teachings, and (c) there must be a reasonable expectation of success. See e.g., M.P.E.P. § 2143. Applicant respectfully traverses the obviousness rejections because at least two of criteria are not met.

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First, Winings and Perman, either alone or in combination, fail to teach or suggest all of the elements of the invention as recited in the pending claims. In particular, the cited references do not disclose a polishing pad without externally produced surface texture.

The Office Action asserts that Winings discloses microcellular polyurethane foam layer 48 with a top surface 49. However, layer 48 is a mounting sheet. The wafers are reversibly mounted on the top surface 49 to permit the exposed surface of the wafer to be polished by polishing pad 25. See Winings abstract. The mounting layer 48 retains the wafers against the lateral polishing forces. See Winings abstract. While Winings discloses that the top layer 49 of mounting sheet 48 is smooth in appearance, Winings does not describe the surface texture of polishing pad 25. Thus, Winings fails to explicitly disclose a polishing pad without externally produced surface texture. Moreover, Perman does not correct this deficiency.

Second, there is no suggestion or motivation to combine the references in such a way as to arrive at the claimed subject matter. In order to set forth a *prima facie* case of obviousness based on a combination of references under Section 103(a), the Office Action must identify a "clear and particular" teaching, suggestion, or motivation to combine the references. *In re Demiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999), *abrogated on other grounds* by *In re Gartside*, 203 F.3d 1305, 1316, 53 U.S.P.Q. 2d 1769, 1769-1770 (Fed. Cir. 2000); *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998); *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1051 (Fed. Cir. 1988). As the Federal Circuit has stated, "combining prior art references without evidence of such a suggestion, teaching or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability – the essence of hindsight." *In re Demiczak*, 175 F.2d at 999.

The Office Action asserts that the ordinarily skilled artisan, given the disclosure of Xu as a guide, would be motivated to select the thermoplastic foam disclosed by Perman, despite the fact that there is nothing in Xu that points to such a combination (as opposed to, for example, the combination of Xu with a different reference that discloses a different polymeric material). The only connection between the cited references seems to be the fact that Xu suggests the preferable use of microcellular material having voids on the order of 0.1 to 1000 micrometers. The Office Action does not provide evidence as to why the ordinarily skilled

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artisan would select the thermoplastic foam disclosed by Perman over hundreds of other prior art cellular polymeric materials.

Given that the disclosure of Xu lacks specific guidance regarding the type of cellular polymeric material to be used, and given that the disclosure of Perman lacks any suggestion that its inventive thermoplastic foam should be used for polishing pads, one of ordinary skill in the art would not be motivated to combine the cited references, except with the improper hindsight of the present invention.

The rejection based on the combination of Winings and Perman is likewise improper because the Office Action fails to point out "clear and particular" teaching, suggestion, or motivation to combine the references. In fact, there is no connection between the cited references because Winings does not discuss what polishing pad 25 can be made of, and the disclosure of Perman lacks any suggestion that the thermoplastic foam should be used for polishing pads.

As a result, one of ordinary skill in the art would not have been motivated to combine the disclosures of the cited references in such a way as to arrive at the claimed invention.

Furthermore, even if the Office Action had made out a *prima facie* case of obviousness, such *prima facie* case is rebutted by evidence that the polishing pad without externally produced surface texture, as recited in the pending claims, demonstrates surprising polishing activity. In Example 4, the inventive microporous foam polyurethane polishing pad was used to chemically-mechanically polish blanket silicon dioxide wafers. The polishing pad was used without any conditioning (i.e., formation of microgrooves or microstructure), buffing, or external macrogrooves (i.e., macrotexture). The polishing pad produced substantial polishing removal rates of silicon dioxide blanket wafers, i.e., approximately 600-900 Å/min, even in the absence of any conditioning, buffing, or groove macrotexture.

This result is surprising in view of the prior art. It is well known in the art that for effective polishing, the pad surface must have both microtexture, i.e., asperities created by conditioning, and macrotexture, i.e., large dimension texture usually cut into the pad. See D.B. James, "CMP Polishing Pads," Chemical-Mechanical Planarization of Semiconductor Materials, Chapter 6, (Springer, 2004), p. 189 (hereinafter "James"). Examples of polishing

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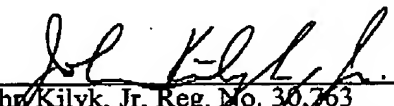
pads without externally produced surface texture have much lower polishing rates under similar conditions than the 600 Å/min polishing rate recited in the pending claims. In U.S. Patent 5,489,233 (Cook et al.) (Document AE in the Information Disclosure Statement filed on March 3, 2004), a solid polyurethane polishing pad has a polishing rate of less than 50 Å/min with no externally produced macro or microtexture (col. 7, Example 2). However, after microtexture was added with a diamond conditioning device, the polishing rate increased to 564 Å/min, or after macrotexture was introduced by cutting, the polishing rate increased to 570 Å/min (col. 7, Examples 2 and 3).

In view of the foregoing, the subject matter of the pending claims cannot properly be considered obvious over the cited references. Accordingly, Applicant respectfully requests that the obviousness rejections be withdrawn.

Conclusion

Applicant respectfully submits that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,


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